
Central Coast Regional Water Quality Control Board

AGRICULTURAL REGULATORY PROGRAM

**RESOURCES FOR GROWERS
NITRATE IN DRINKING WATER
March 28, 2013**

What is nitrate (NO₃)?

Nitrate is a common contaminant found in groundwater and can occur naturally at low concentrations. Nitrate is colorless and odorless. In pristine areas, shallow groundwater that is unaffected by human activities commonly contains less than 2 milligrams per liter (mg/L) of nitrate. Small amounts of nitrate are normal, but excess amounts can pollute supplies of groundwater. Common sources of nitrogen in the soil are fertilizers, livestock waste, and septic systems. Excess nitrate in the soil is most often found in rural and agricultural areas. Some agricultural areas of the Central Coast region have higher than normal concentrations of nitrate. Nitrate travels easily through the soil carried by rain or irrigation water into groundwater supplies. Drinking water wells may be affected. Wells in agricultural areas that are shallow, placed in sandy soil, or wells that are improperly constructed or maintained are more vulnerable to nitrate contamination.

Are their drinking water standards for nitrate?

The current State Maximum Contaminant Level (MCL) for nitrate in California is 45 mg/L as Nitrate or 10 mg/L as Nitrogen. The California Department of Public Health (CDPH) regulates nitrate in drinking water when water is supplied to public water systems with 200 or more service connections. Local counties may also regulate smaller systems. If any of these systems have nitrates exceeding the MCL, they are required to reduce the levels to below the MCL prior to providing water to their customers. For projects or building permits that require CDPH to approve a new or existing well as a potable water supply, the nitrate level must be below the MCL.

For individual domestic supply wells, the MCL is an advisory for existing well use. As the owner/operator of the private domestic well, you are responsible for all necessary testing and ensuring that the water is safe to drink.

What are the health effects from drinking nitrate impacted water?

Nitrate in drinking water poses an acute health concern at certain levels of exposure. Unlike most drinking water MCLs, the nitrate MCL is based upon an observed human effect in highly sensitive persons. There is no safety factor incorporated into the standard. Excessive levels of nitrate in drinking water have caused serious illness and sometimes death in infants less than

six months of age. The serious illness in infants is caused because nitrate is converted to nitrite in the body. Nitrite interferes with the oxygen carrying capacity of the blood, causing a condition called Methemoglobinemia ("blue baby syndrome"). This is an acute disease and the symptoms can develop rapidly in infants. In most cases, health deteriorates over a period of days. Symptoms include shortness of breath and blueness of the skin, especially around the eyes and mouth. High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women. CDPH has set the drinking water MCL for nitrate to protect against the risk of these adverse effects. CDPH has also set a drinking water standard for nitrite at 1 mg/L. Since the toxicity of nitrate and nitrite are additive, CDPH has also established a standard for the sum of nitrate and nitrite at 10 mg/L as nitrogen. Infants six months of age and younger, and pregnant and nursing women should avoid consumption of water high in nitrate...

The good news is that doctors can treat Methemoglobinemia and babies can make a full recovery. In addition, health risks are reduced for children older than six months of age and adults. For more information on the risks of nitrate consumption, consult your doctor.

Do I have to test my well?

Growers enrolled in Agricultural Order R3-2012-0011 are required to sample any domestic drinking water well and the primary irrigation well at their agricultural operation. Private well owners/operators are responsible for ensuring that their well water is safe to drink. Residents of some counties may be able to obtain assistance with the sampling of their wells. Please contact your local water district or County Environmental Health Department directly to obtain information concerning any available well testing assistance programs in your area. A list of county contacts is provided below.

What type of treatment is available?

Nitrates are easily dissolved in water and there is no simple way to remove all nitrate from water. Although it is common to think of boiling, softening, or filtration as a means of purifying water, none of these methods reduce nitrate contamination. Boiling the water before drinking it does not remove nitrate. In fact, it causes some of the water to evaporate, which increases the nitrate concentration. Softening and filtration do nothing at all to remove nitrate. Some available solutions are presented below. It is up to the individual well owner to evaluate the specific situation that affects his or her well and determine the appropriate solution.

Immediate Solution - If the level of nitrate in your water is high, an immediate solution is to use an alternative source of water for drinking, cooking, and mixing baby formula. DO NOT BOIL the water that is high in nitrate – it makes the problem worse.

Long-term Solution - For a long-term solution, you can treat the water to remove the nitrate. Treatment technologies that remove nitrate include reverse osmosis, ion exchange, and distillation. Each type of system has advantages and disadvantages, and no single system will correct all water quality problems. Water treatment system vendors are listed in the yellow pages or on the Internet by searching "Water Filtration & Purification Equipment." Treatment systems are also available at some department stores for the do-it-yourself installers. When you purchase a system, be clear about the type of system that you need, and ask for a guarantee that the system will remove nitrate contamination. It is important to properly operate and maintain your treatment system to ensure it is effective. Also, some systems require proper disposal of waste so that it does not re-contaminate the groundwater supply. Even if treatment

is installed, it is the well owner's responsibility to perform a periodic maintenance for the treatment system and ensure its proper function. Therefore, it is suggested to test your well water periodically.

Public water supplies are required to treat the water and properly dispose of the treatment waste to meet the MCL for nitrates, if the well sources exceed the nitrate MCL. These water systems are also required to be operated by a certified water treatment plant operator, and tested routinely for water quality. This is not an option for private domestic well owners.

Are other options available for domestic well owners?

Many options are available to help reduce the vulnerability of your domestic well to pollution, including the following:

- Evaluate the well location. Are livestock or animal enclosures located within 100 feet of the well? If so, relocate these enclosures at least 100 feet away from the well.
- Is stockpiled manure stored within 100 feet of the well? If so, relocate the stockpiles at least 100 feet away from the well.
- Is the septic system located less than 100 feet from the well? If possible, consider relocating the septic system.
- Is the well located in an area of heavy fertilizer use? Consider the location of agriculture use near the well and restrict the use of fertilizers near the well.
- If the nitrates exceed the MCL, test for nitrates through a state certified lab quarterly to determine if any preventative measures have any effect on the nitrate contamination levels.
- Nitrates may be confined in shallow fractures or aquifers. In some situations it may be possible to reconstruct an existing well to extend the casing and annular seal to a depth sufficient to avoid drawing water from the zones contaminated with nitrates. This can be a very expensive process, which still has a possibility of not correcting the problem.
- Another option may be to drill a new well in a more suitable location, and destroy the contaminated well.
- Consider drinking and cooking with bottled water if the nitrate contamination levels cannot be reduced.

For more information about domestic wells and addressing water quality problems, including a "Guide for Domestic Well Owners", please go to the Water Board's website at:

http://www.waterboards.ca.gov/gama/wq_privatewells.shtml

Where else can I get assistance?

For specific questions regarding the safety of your domestic well and more information concerning human health risks associated with drinking water containing elevated levels of nitrate, please contact CDPH or your local County Environmental Health Office using the contacts provided on the next page. In addition, if you have concerns regarding your health or for information on the risks of nitrate consumption, you should consult your doctor.

Local Public and Environmental Health Contacts

California Department of Public Health (CDPH) Drinking Water Program 916-449-5600 www.cdph.ca.gov	
Monterey County Env. Health 831-755-4500 http://montereycountyhealth.org/	Santa Barbara County Env. Health Services 805-346-8460 http://www.countyofsb.org/phd/environmentalhealth.aspx?id=1444
San Benito County Public Health Division 831-637-5367 http://www.sanbenitoco.org/	San Luis Obispo County Env. Health Services 805-781-5544 http://www.slocounty.ca.gov/health/publichealth/ehs.htm
San Mateo County Env. Health Services 650-372-6200 http://smchealth.org/	Santa Clara County Dept. of Env. Health 408-918-3400 http://www.sccgov.org/sites/deh/Pages/DEH.aspx
Santa Cruz County Env. Health Services 831-454-2022 http://www.scceh.com/	Ventura County Environmental Health 805-654-2813 http://www.ventura.org/rma/envhealth/

For more information about the Agricultural Regulatory Program, including additional resources and guidance for growers, please visit the Water Board's Internet site at:
http://www.waterboards.ca.gov/centralcoast/water_issues/programs/aq_waivers/index.shtml

If you have questions regarding the Agricultural Regulatory Program or need additional assistance, please contact the Water Board at (805) 549-3147.